



Wood smoke exposure induces a pulmonary and systemic inflammatory response in firefighters

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Abstract:

Epidemiological studies report an association between exposure to biomass smoke and cardiopulmonary morbidity. The mechanisms for this association are unclear. The aim of the present study was to characterise the acute pulmonary and systemic inflammatory effects of exposure to forest fire smoke. Seasonal forest firefighters (n Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 52) were recruited before and/or after a day of fire-fighting. Exposure was assessed by questionnaires and measurement of carbon monoxide levels (used to estimate respirable particulate matter exposure). The pulmonary response was assessed by questionnaires, spirometry and sputum induction. Peripheral blood cell counts and inflammatory cytokines were measured to define the systemic response. Estimated respirable particulate matter exposure was high (peak levels $>2 \text{ mg} \times \text{m}(-3)$) during fire-fighting activities. Respiratory symptoms were reported by 65% of the firefighters. The percentage sputum granulocytes increased significantly from 6.5 to 10.9% following fire-fighting shifts, with concurrent increases in circulating white blood cells ($5.55 \times 10(9)$ to $7.06 \times 10(9)$ cells $\times \text{L}(-1)$) and band cells ($0.11 \times 10(9)$ to $0.16 \times 10(9)$ cells $\times \text{L}(-1)$). Serum interleukin (IL)-6, IL-8 and monocyte chemotactic protein-1 levels significantly increased following fire-fighting. There were no changes in band cells, IL-6, and IL-8 following strenuous physical exertion without fire-fighting. There was a significant association between changes in sputum macrophages containing phagocytosed particles and circulating band cells. In conclusion, acute exposure to air pollution from forest fire smoke elicits inflammation within the lungs, as well as a systemic inflammatory response.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Extreme Weather Event

Air Pollution: Other Air Pollution

Air Pollution (other): CO

Extreme Weather Event: Wildfires

Geographic Feature:

Climate Change and Human Health Literature Portal

resource focuses on specific type of geography

Other Geographical Feature

Other Geographical Feature : forest

Geographic Location: 

resource focuses on specific location

Non-United States

Non-United States: Non-U.S. North America

Health Impact: 

specification of health effect or disease related to climate change exposure

Respiratory Effect, Other Health Impact

Respiratory Effect: Other Respiratory Effect

Respiratory Condition (other) : pulmonary inflammation

Other Health Impact: systemic inflammation

Population of Concern: A focus of content

Population of Concern: 

populations at particular risk or vulnerability to climate change impacts

Workers

Resource Type: 

format or standard characteristic of resource

Research Article

Timescale: 

time period studied

Time Scale Unspecified